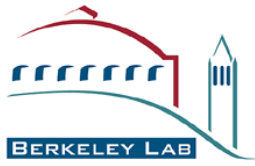# GIN-Data : SRM Island
Inter-Op Testing
With SRM-TESTER

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Goals

- **Demonstrate data access to independent grid storage systems managed by SRMs**
  - Read access to a file in a remote grid storage
  - Write access to a registered user account in a remote grid storage
  - A file replication for a registered user between two independent grid storage systems
  - Space reservation and write access to the reserved space for a registered user in a remote grid storage (for SRM V2.2)

Why do we need inter-op testing for SRMs?

- **Storage Resource Managers (SRMs) are based on a common interface specification.**
  - SRMs can have different implementations for the underlying storage systems.
  - Compatibility and interoperability need to be tested according to the specification.
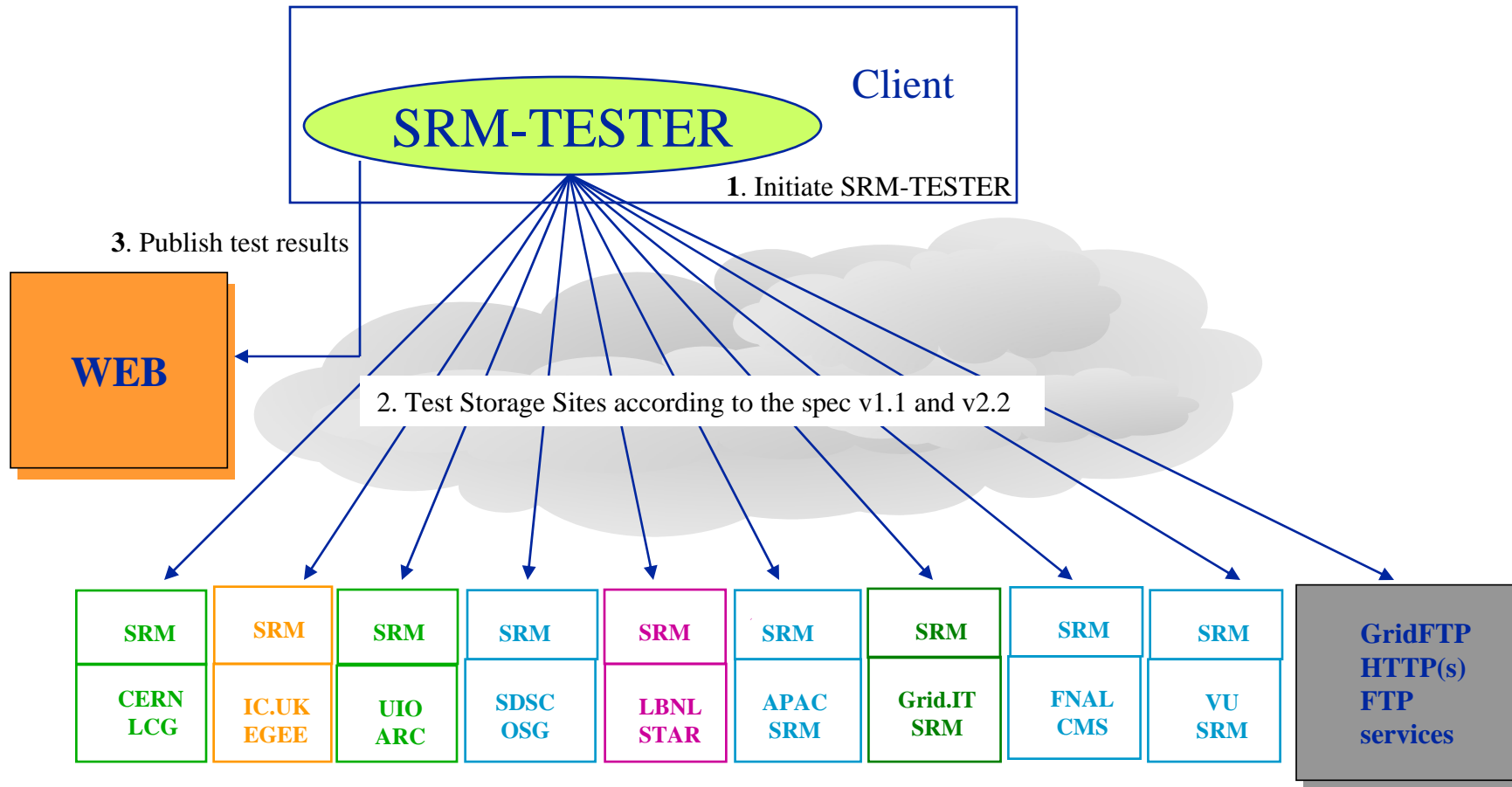
What is SRM-TESTER?

- **SRM-Tester tests Storage Sites managed by SRMs**
  - Independent implementation of a special SRM client that adheres to the SRM specification for the purpose of testing multiple SRM servers
    - Tests conformity of the SRM server interface according to the SRM spec v1.1, and v2.2
    - Tests compatibility and interoperability of the SRM servers according to the SRM spec

- **SRM-Tester also tests file transfer protocols**
  - Supported protocols
    - gsiftp, ftp, http and https

- **SRM-Tester can publish the testing results to a designated web site**

- **Applied in Open Science Grid**

GIN-Data SRM inter-op testing

Client

SRM-TESTER

1. Initiate SRM-TESTER

3. Publish test results

WEB

2. Test Storage Sites according to the spec v1.1 and v2.2

SRM	SRM	SRM	SRM	SRM	SRM	SRM	SRM	SRM	GridFTP
CERN LCG	IC.UK EGEE	UIO ARC	SDSC OSG	LBNL STAR	APAC SRM	Grid.IT SRM	FNAL CMS	VU SRM	HTTP(s) FTP services

A. Sim, CRD, LBNL

GGF18, Sep. 11, 2006

5

GIN-Data SRM island testing

- ## Which operations have been tested?
  - ### SRM v1.1
    - ping, put, get, advisory delete, copy
  - ### SRM v2.2
    - ping, put, release file, get, get status, bring online, reserve space, release space, browsing (ls), copy

- ## Test results are published
  - ### http://sdm.lbl.gov/srm-tester/ggf18.html

Participating Sites

- **9 Sites participated**
  - **6 SRM V1.1 were tested**
  - **6 SRM V2.2 were tested**

- **APAC**
  - **SRM is not ready**
- **ARC**
  - **srm://grid.uio.no:58000**
- **CMS**
  - **srm://fledgling05.fnal.gov:8443**
  - **srm://fledgling06.fnal.gov:8443 (SRM v2.2 dCache)**
- **EGEE**
  - **srm://gfe02.hep.ph.ic.ac.uk:8443**
- **Grid.IT**
  - **SRM is not installed publicly and not ready for testing**
- **LCG/EGEE**
  - **srm://lxdpm01.cern.ch:8443**
  - **srm://lxdpm01.cern.ch:8446 (SRM v2.2 DPM)**
  - **srm://lxb1389.cern.ch:8442 (SRM v2.2 CASTOR)**
  - **srm://castor300.ads.rl.ac.uk:8443 (SRM v2.2 CASTOR)**
- **OSG**
  - **srm://t2data2.t2.ucsd.edu:8443**
- **STAR**
  - **srm://dmx09.lbl.gov:6175**
  - **srm://dmx09.lbl.gov:8443 (SRM v2.2)**
- **VU**
  - **srm://dmx09.vanderbilt.edu:6175 (SRM v2.2 L-Store)**

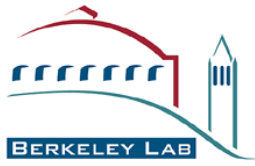# Testing Operations (SRM V1.1) Description

- **Ping**
  - Tester checks to see if SRM server responds properly
  - GSI security may or may not be enforced

- **Put**
  - Tester writes a file into the SRM managed, VO specific directory from client's local disk
  - Tester checks the transfer protocol during the file transfers

- **Get**
  - Tester requests a file from the SRM managed, VO specific directory
  - When the file is ready, SRM returns TURL (Transfer URL) with transfer protocol.
  - Tester makes file transfers from the TURL to the client's local disk

- **Advisory Delete**
  - Tester requests to "remove" a file in the SRM managed, VO specific directory. This is advisory only.

- **Copy**
  - Tester requests to "replicate" a file from one SRM to another SRM
  - Tester requests to "replicate" a file from a remote gsiftp server to an SRM
  - Tester checks inter-operability between SRMs
  - In this test, SRMs are in separate independent data grids

Testing Operations (SRM V1.1) Results

	ping	put	get	Advisory delete	Copy (SRMs)	Copy (gsiftp)
ARC (UIO.NO)	pass	**fail**	pass	**fail**	**pass**	**fail**
EGEE (IC.UK)	pass	pass	pass	pass	pass	pass
CMS (FNAL.GOV)	pass	pass	pass	pass	pass	pass
LCG/EGEE (CERN)	pass	pass	pass	pass	**N.A.**	**N.A.**
OSG (SDSC)	pass	pass	pass	pass	**pass**	**fail**
STAR (LBNL)	pass	pass	pass	pass	pass	pass

A. Sim, CRD, LBNL   GGF18, Sep. 11, 2006

Testing Operations (SRM V1.1) Results (COPY/PULL)

Target SRM → / Source SRM ↓	ARC (UIO.NO)	LCG/EGEE (CERN.CH)	CMS (FNAL.GOV)	STAR (LBL.GOV)	OSG (SDSC.EDU)	EGEE (IC.UK)
ARC (UIO.NO)		N.A.	pending	pass	N.A.	fail
LCG/EGEE (CERN.CH)	fail		pass	pass	N.A.	pass
CMS (FNAL.GOV)	fail	N.A.		pass	N.A.	pass
STAR (LBL.GOV)	fail	N.A.	pass		N.A.	pass
OSG (SDSC.EDU)	fail	N.A.	pass	pass		pass
EGEE (IC.UK)	fail	N.A.	pass	pass	N.A.	

Testing Operations (SRM V1.1) Results (COPY/PUSH)

		ARC (UIO.NO)	LCG/EGEE (CERN.CH)	CMS (FNAL.GOV)	STAR (LBL.GOV)	OSG (SDSC.EDU)	EGEE (IC.UK)
Target SRM ➔							
Source SRM ↓							
ARC (UIO.NO)			fail	fail	fail	fail	fail
LCG/EGEE (CERN.CH)		N.A		N.A	N.A	N.A	N.A
CMS (FNAL.GOV)		fail	pass		pass	fail	pass
STAR (LBL.GOV)		fail	pass	pass		pass	pass
OSG (SDSC.EDU)		N.A	N.A	N.A	N.A		N.A
EGEE (IC.UK)		fail	pass	pass	fail	pass	

Testing Operations (SRM V1.1) Results (COPY/PULL/GSIFTP)

Target SRM ➜		ARC (UIO.NO)	LCG/EGEE (CERN.CH)	CMS (FNAL.GOV)	STAR (LBL.GOV)	OGS (SDSC,EDU)	EGEE (IC.UK)
Source GSIFTP ⬇							
Gsiftp server from GT4.0.1		fail	N.A.	pass	pass	N.A.	pass

- ## COPY (SRM) operation
  - ### SRM-Tester sends a request to the target SRM to "pull" a file from the source SRM.
    - After a copy request is submitted to the target SRM, communication thereafter is between the two SRMs. SRM-Tester checks the status of the copy request.
    - In this test, SRM at SDSC (OSG) and IC.UK (EGEE) were the source SRMs to copy a file to other SRMs
  - ### A copy to SRM at CERN (LCG/EGEE)
    - The request goes through the interface, and the status shows request queued and in progress.
    - We were told that actual copy is not implemented.
  - ### A copy to SRM at SDSC (OSG)
    - The status returned failure with explanation "Space Reservation failed".
    - We were told that it was due to the underlying storage inside the private network.
  - ### A copy to SRM at LBNL (STAR)
    - The status returned pending.
    - SRM at LBNL allocated space and returned to the SRM at UK, but pushing the file did not happen.

Testing Operations (SRM V1.1) Explanation on failure (2)

- ## COPY (GSIFTP) operation

  - SRM-Tester sends a request to the target SRM to pull a file from the source gsiftp server

    - In this test, gsiftp server based on GT4.0.1 at LBNL (STAR) was the source to copy a file to other SRMs
    - When the first copy test failed, gsiftp server based on GT 2.4.3 at LBNL (STAR) was used as the source for additional testing, for possible certificate format handling issues.

  - A copy to SRM at CERN (LCG/EGEE)

    - The request goes through the interface, and the status shows request queued and in progress.
    - We were told that actual copy is not implemented.

  - A copy to SRM at SDSC (OSG)

    - The status returned failure with no further explanation.
    - We were told that only "push" mode into the SRM at SDSC works due to the underlying storage inside the private network.

- ## SRM at ARC

  - **Operations except "ping" and "get" failed**

  - **"put" operation failed because ARC supports http put method to write files, whereas srm-tester and srmcp (v1.23) use http post method.**

  - **NGCP (NorduGrid ARC standalone v0.5.46) works for operations except copy**

  - **COPY/PULL worked only once, but after server configuration was changed, the same operation did not work any more.**

  - **Since GGF-17, there have been efforts and progress for compatibility.**

Testing for SRM V2.2

- **SRM V2.2 adds new functions on SRM V2.1.**

- **SRM V2.2 is a new specification**

- **All five implementations are still in-progress**

- **Testing results shown here represent a progress report for the current collaboration sites.**
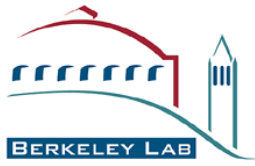
Testing Operations (SRM V2.2) Description (1)

- **srmPing**
- **srmPrepareToPut**
  - Tester writes a file into the SRM managed, VO specific directory from client's local disk
  - Tester checks the transfer protocol during the file transfers
  - Tester issues srmPutDone() after file tranfer is completed
- **srmPrepareToGet**
  - Tester requests a file from the SRM managed, VO specific directory
  - When the file is ready, SRM returns Transfer URL with transfer protocol.
  - Tester makes file transfers from the Transfer URL to the client's local disk
- **srmReleaseFile**
  - Tester releases a file after file transfer is completed (following Get operation)
- **srmBringOnInie**
  - Tester requests a file from the SRM managed, VO specific directory
  - When the file is ready on line, SRM returns the proper status.
- **Browse (srmLs)**
  - Tester browses a file or a directory in the SRM managed, VO specific space

- **srmCopy**
  - **Three different types of copy were tested**
    - **Request to "cp" a file from one space to another space in the same SRM.**
    - **Request to "replicate" a file from one SRM to another SRM.**
    - **Request to "replicate" a file from a remote gsiftp server to an SRM.**

- **Reserve Space**
  - **Tester requests to reserve a volatile or durable space under the SRM for an amount of byte size**

- **Get Status of the space reservation**
  - **Tester checks the status of the space with the space token received from the space reservation**

- **Put a file into the reserved space**
  - **Similar to "put" operation, but a specific space token is used**

- **Release space**
  - **Tester releases the reserved space with the space token.**

Testing Operations (SRM V2.2) Results (9/4/2006)

Methods	CERN Castor	CERN DPM	FNAL dCache	RAL Castor	VU L-Store	LBNL SRM
Ping	Ok	Ok	Exception	Ok	Ok	Ok
PrepareToPut, Status, PutDone	N.A.	Ok	Ok	Ok	Ok	Ok
PrepareToGet, Status	Exception	Ok	Ok	Failed	Ok	Ok
Release	N.A.	Ok	Ok	N.A.	Ok	Ok
Mkdir	Ok	Ok	Ok	Ok	Ok	Ok
Rmdir	Ok	Ok	Ok	Ok	Ok	Ok
Mv	N.A.	Ok	Ok	Ok	Ok	Ok
Rm	N.A.	Ok	Ok	Ok	Ok	Ok
Ls	Exception	Exception	Ok	Exception	Ok	Ok
ReserveSpace	Failed	Ok	Ok	Failed	Ok	Ok
ReleaseSpace	N.A.	Ok	Ok	N.A.	Ok	Ok
BringOnline, Status	N.A.	Ok	N.A.	N.A.	Ok	Ok

Testing Operations (SRM V2.2) Results (9/4/2006)

Operations with Space Reservation

Methods	CERN Castor	CERN DPM	FNAL dCache	RAL Castor	VU L-Store	LBNL SRM
PrepareToPut, Status, PutDone (with space-token)	N.A.	Ok	**Ok**	N.A.	Ok	Ok
PrepareToGet, Status (with space-token)	N.A.	Ok	N.A.	N.A.	Ok	Ok
BringOnline, Status (with space-token)	N.A.	Ok	N.A.	N.A.	Ok	Ok

Testing Operations (SRM V2.2) Results (9/4/2006)

Copy/PULL Target SRM → Source SRM ↓	CERN Castor	CERN DPM	FNAL dCache	RAL Castor	VU L-Store	LBNL SRM
CERN Castor		*N.A.*	*Failed*	*N.A.*	*Failed*	*Failed*
CERN DPM	*N.A.*		*Ok*	*N.A.*	*Ok*	*Ok*
FNAL dCache	*N.A.*	*N.A.*		*N.A.*	*Ok*	*Ok*
RAL Castor	*N.A.*	*N.A.*	*Failed*		*Failed*	*Failed*
VU L-Store	*N.A.*	*N.A.*	*Failed*	*N.A.*		*Ok*
LBNL SRM	*N.A.*	*N.A.*	*Failed*	*N.A.*	*Ok*	

Copy/PUSH Target SRM → Source SRM ↓	CERN Castor	CERN DPM	FNAL dCache	RAL Castor	VU L-Store	LBNL SRM
CERN Castor		*N.A.*	*N.A.*	*N.A.*	*N.A.*	*N.A.*
CERN DPM	*N.A.*		*N.A.*	*N.A.*	*N.A.*	*N.A.*
FNAL dCache	*Failed*	*Ok*		*Ok*	*Failed*	*Failed*
RAL Castor	*N.A.*	*N.A.*	*N.A.*		*N.A.*	*N.A.*
VU L-Store	*Failed*	*Ok*	*Ok*	*Ok*		*Ok*
LBNL SRM	*Failed*	*Ok*	*Ok*	*Ok*	OK	

Testing Operations (SRM V2.2) Results (9/4/2006)

Methods	CERN Castor	CERN DPM	FNAL dCache	RAL Castor	VU L-Store	LBNL SRM
COPY from Gridftp Source to SRM	Failed (work in progress)	N.A.	Ok	Failed (work in progress)	Ok	Ok

3rd Party Copy Target SRM → Source SRM ↓	CERN Castor	CERN DPM	FNAL dCache	RAL Castor	VU L-Store	LBNL SRM
CERN Castor		N.A.	N.A.	N.A.	N.A.	N.A.
CERN DPM	N.A.		Ok	Ok	Ok	Ok
FNAL dCache	N.A.	Ok		Ok	Ok	Ok
RAL Castor	N.A.	N.A.	N.A.		N.A.	N.A.
VU L-Store	N.A.	Ok	Ok	Ok		OK
LBNL SRM	N.A.	Ok	Ok	Ok	OK	

Status

- ## SRM v1.1 operations
  - **Most implementations are compliant with the specification**
  - **Interoperability between SRMs was mostly tested successfully**
  - **Incompatibility mostly comes from the transfer protocols and the underlying storage configurations, not from interface incompatibility**
    - **Information service to advertise capabilities of individual SRMs would help**

- ## SRM v2.2 operations
  - **Six participating implementations**
    - **Implementation is in-progress**
    - **Interoperation testing will continue until the deployment**

Acknowledgement

- **APAC**
  - Univ. of Melbourne : Glenn Moloney
- **ARC**
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- **EGEE**
  - CERN : Erwin Laure
  - Imperial College : Mona Aggarwal, Olivier van der Aa, David Colling
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- **Grid.IT**
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  - INFN : Vincenzo Ciaschini

Documents and Support

- **Test results**
  - **http://sdm.lbl.gov/srm-tester/ggf18.html**

- **SRM Collaboration and SRM Specifications**
  - **http://sdm.lbl.gov/srm-wg**

- **SRM-Tester : Distribution/Documentation**
  - **http://sdm.lbl.gov/srm-dist**
  - **VDT pacman as srm-tester**

- **Contact and support : srm@lbl.gov**
  - **Alex Sim, Arie Shoshani**